JC10 Rec'd PCT/PTO 15 JAN 2002

FORM PTO-1390 (REV. 9-2001) U S DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371

ATTORNEY'S DOCKET NUMBER: 34323

U S. APPLICATION NO (If known, see 37 CFR 1 5): 10/031040

INTERNATIONAL APPLICATION NO.	INTERNATIONAL FILING DATE	PRIORITY DATE CLAIMED
PCT/FR00/02030	13 July 2000 (13.7.00)	16 July 1999 (16.7.99)

TITLE OF INVENTION: FLOAT FOR A TOWED LINE

APPLICANT(S) FOR DO/EO/US: 1) Philippe Hocquet 2) Pierre Loic Boudet

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. [] This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. [] This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.
4. [X] The US has been elected by the expiration of 19 months from the priority date (Article 31).
5. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 a. [] is attached hereto (required only if not communicated by the International Bureau).
 b. [X] has been communicated by the International Bureau.
 c. [] is not required, as the application was filed in the United States Receiving Office (RO/US).
6. [X] An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).
 a. [X] is attached hereto.
 b. [] has been previously submitted under 35 U.S.C. 154(d)(4).
7. [X] Amendments to the claims of the International Aplication under PCT Article 19 (35 U.S.C. 371(c)(3))
 a. [] are attached hereto (required only if not communicated by the International Bureau).
 b. [] have been communicated by the International Bureau.
 c. [] have not been made; however, the time limit for making such amendments has NOT expired.
 d. [X] have not been made and will not be made.
8. [] An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371 (c)(3)).
9. [] An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).
10. [X] An English lanugage translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11 to 20 below concern document(s) or information included:

11. [] An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
12. [] An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. [] A FIRST preliminary amendment.
14. [] A SECOND or SUBSEQUENT preliminary amendment.
15. [] A substitute specification.
16. [] A change of power of attorney and/or address letter.
17. [] A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.
18. [] A second copy of the published international application under 35 U.S.C. 154(d)(4).
19. [] A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).
20. [X] Other items or information: Certificate of Mailing
 Postcard

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U.S. APPLICATION NO (if known, see 37 CFR 1.5)	INTERNATIONAL APPLICATION NO	ATTORNEY'S DOCKET NUMBER
10/031040	/02030	34323

	CALCULATIONS PTO USE ONLY	
21. [X] The following fees are submitted:		
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)):		
Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO **$1040.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO **$890.00**		
International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO **$740.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) **$710.00**		
International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) **$100.00**		
ENTER APPROPRIATE BASIC FEE AMOUNT =	$ 890	
Surcharge of **$130.00** for furnishing the oath or declaration later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(e)).	$	

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	
Total claims	19 - 20 =	0	x **$18.00**	$ 0
Independent claims	1 - 3 =	0	x **$84.00**	$ 0
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ **$280.00**	$ 280
TOTAL OF ABOVE CALCULATIONS =				$ 1170.00
[] Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2. +				$
SUBTOTAL =				$
Processing fee of **$130.00** for furnishing the English translation later than [] 20 [] 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				$
TOTAL NATIONAL FEE =				$
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). **$40.00** per property +				$
TOTAL FEES ENCLOSED =				$ 1170.00
			Amount to be refunded:	$
			charged:	$

a. [X] A check in the amount of $ 1170.00 to cover the above fees is enclosed.

b. [] Please charge my Deposit Account No. _____ in the amount of $ _____ to cover the above fees. A duplicate copy of this sheet is enclosed.

c. [X] The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 160820 . A duplicate copy of this sheet is enclosed.
Order No. 34323

d. [] Fees are to be charged to a credit card. **WARNING:** Information on this form may become public. **Credit card information should not be included on this form.** Provide credit card information and authorization on PTO-2038.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO

Michael W. Garvey
Pearne & Gordon LLP
526 Superior Ave, Suite 1200
Cleveland, Ohio 44114-1484

SIGNATURE

Michael W. Garvey
NAME

35878
REGISTRATION NUMBER

10/031040
1/PRTS 1 531 Rec'd PCT/PT 15 JAN 2002

FLOAT FOR A TOWED LINE

The present invention relates to a float for a towed line, whose field of application is generally seismic measurements at sea, in which a battery of lines carrying acoustic sensors is towed at the stern of a ship. Each of the lines comprises a deflector in front of the sensors, which is a submerged and vertical wing which incurs a transversal lift and maintains the line alongside the wake of the ship, and a float from which the deflector is suspended and whose aim is to prevent the line from sinking under the weight of the deflector.

The floats must be almost insensitive to the disturbances to which they may be submitted, in particular by the sea swell. Unfortunately, as far as this is concerned, the known floats oscillate too easily in the vertical direction following the movements of the swell. The suspension line of the float deflector is submitted to periodic surges which can end by fatigue rupture or can create damage to the connections, and the quality of measurement can also be disturbed. The float to be described below overcomes this disadvantage while still retaining good directional stability, above all in its most advantageous embodiment.

The known floats have a fuselage shape, expanded in the centre and progressively tapered towards the ends. The float according to the invention comprises a horizontal portion of the floating body whose shape is also substantially fuselage shaped, but also an upper

part of the floating body, extending from the horizontal portion upwards and with horizontal cross-sections which are closely uniform; in addition, the horizontal portion is completely submerged and the upper portion is partially emerged when the float holds the line, or a heavy element of the latter.

The vertical movement of the sea swell is therefore represented above all by a variation of the immersion of the upper portion without any special force on the float because of the uniformity of its cross-section and the small variation of the submerged volume: the vertical oscillating movement of the float and its load therefore does not have a great amplitude.

The stability is still better if the upper portion is higher at the rear of the horizontal portion, and particularly if the suspension element of the deflector is located in front of the upper portion.

If this suspension element comprises a single articulation around a transversal axis, the float is restrained from rolling movements and comes back into place more easily.

The directional stability of the float is improved if its horizontal portion is wider than its height, which makes it possible to reduce its lateral surface, and thus the lateral disturbing forces.

The invention will now be described with the aid of the figures below, showing one embodiment:

- figure 1 is a side view of the float,
- figure 2 is a view from above the float,
- figure 3 is a cross-section of the float along the line III-III.

A part of the line towed for seismic measurements is shown in figure 1. It comprises, on either side of a submerged deflector 1, a front portion of line 2 attached to a ship located on the left and a rear portion of line 3 to which the sensors are attached located on the right (outside the figure). In addition, a line deviation 4 links the fore and aft portions 2 and 3 avoiding the deflector 1, and serves for transmitting the signal from the sensors to the ship. The deflector 1 is maintained at a closely constant depth thanks to a float 5, characteristic of the invention, preventing it from sinking lower, whether it is suspended by a cable or by a chain 18.

The float 5 comprises a horizontal and lower portion of a floating body here called a fuselage 6 and an upper vertical portion of a floating body called a leg 7. The fuselage 6 has: a front portion 8 intended to promote penetration in the water and which is therefore tapered towards the front, as far as a rounded end 9; a median portion 10 of closely uniform cross-section; and a rear portion 11 reducing towards the rear, a base surface 12 of the fuselage 6 at this point having a rising step 13 to recede upwards and to form a concave housing for a vertical fin 14; other fins, horizontal, 15, are placed on the sides of the fuselage 6. The horizontal fins 15 are a disadvantage in that they increase the transversal dimensions of the float 5, but they can be made detachable or retractable to make them disappear when the float 5 is on board the ship. It is advantageous for the cross-sections of the fuselage 6 to be closely rectangular and for its faces

to be defined by the edges 24 forming almost sharp edges as shown in figure 3. Preferably, the base 12 is flat over the greater part of its length, particularly in the median part 10, and the upper surface of the fuselage 6 forms an upper flat deck 16 between the median part 10 and the rear part 11.

Advantageously, the leg 7 is at the back of the fuselage 6 and extends substantially over half of its length, substantially over the whole of the rear part 11 and over half of the median part 10. A suspension element 17 of the deflector 1 by the chain 18 is attached to the base 12, and comprises a coupling 19 fixed to the fuselage 6, a connecting rod 20 connected to the chain 18 and a transversal axis articulation 25 between them, which thus makes it possible for the connecting rod 20 to oscillate backwards and forwards but not laterally, such that the deflector 1 helps to stabilise the float 5 against rolling movements by restraining its rotation around the longitudinal axis. A safety chain 26 could further unite the deflector 1 to the coupling 19 and support it if the suspension element 17 were to break. The connecting rod 20 can include a shock absorber.

The leg 7 is substantially half-submerged under the surface of the water E and comprises a front portion 21 rounded as a half-cylinder to promote penetration, and a rear portion 22 formed of two surfaces joined together at an edge 23 located at the rear. The leg 7 is smooth, with substantially identical cross-sections, in order to limit the forces produced by the vertical movements of the sea swell.

The mechanical principle sought consists generally of making the actual frequency of heaving (vertical oscillatory movement) of the float 5 close to a value where the movements of the swell only exert a minimum force, which attenuates the forces on the suspension element 17. The dimensions of the fuselage 6 and the cross-section of the leg 7 can be chosen in consequence, as a function of the results of digital simulations or pool trials. However, it was noted that a positive result was more easily obtained if the base 12 and the deck 16 were flat and relatively close to each other, which justifies the fuselage being wider than it is high. One also tries to increase the friction produced by the vertical movement of the water in order to damp down the oscillation of the float 5; the almost sharp angles of the edges 24 of the fuselage 6, as well as the horizontal fins 15, provide this result by creating eddies.

Other considerations concern the stabilisation of the forward movement of the float 5. It is normal to improve it by providing the floats with appendages, which can however increase the towing force and to elongate them towards the rear. Such appendages are not needed here, where the leg 7 works as a rudder, the vertical fin 14 having the same effect if it is added. The leg 7 is best set behind the fuselage 6, and the coupling 19 also as far to the front as possible so that it does not upset the balance of the float 5, in front of the leg 7 or at least the greater part of it. The centre of the hull of the float 5 must be brought forward and its centre of gravity moved backward. The

flattening of the fuselage 6 and the reduction of its resulting lateral surface is also positive concerning this, since the lateral disturbances produced by the water will be reduced.

In general, it is preferable not to place ballast in the float 5, which could make it more stable but which would increase its mass and its displacement.

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English translation of the amended sheets of International Preliminary Examination Report

CLAIMS

1. Float (5) for a towed line, comprising a horizontal portion (6) with a fuselage shape, characterised in that it comprises an upper portion (7), extending upwards from the horizontal portion and in that the horizontal portion is completely submerged, and the upper portion is partly emerged, when the float supports an element (1) of the line.

2. Float according to claim 1, characterised in that the upper portion (7) rises at the rear of the horizontal portion (6).

3. Float according to claim 2, characterised in that a suspension element (19) of a portion (1) of the line, located under the horizontal portion, is also set in front of at least the greater part of the upper portion (7).

4. Float according to claim 3, characterised in that the suspension element (19) comprises a single articulation (25), which has a transversal axis.

5. Float according to any one of claims 1 to 4, characterised in that the horizontal portion (6) is wider than it is high.

English translation of the amended sheets of International Preliminary Examination Report

6. Float according to claim 5, characterised in that the horizontal portion has a base (12) and an upper deck (16), both partially flat.

7. Float according to claim 6, characterised in that the horizontal portion has closely rectangular cross-sections.

8. Float according to any one of claims 5 to 7, characterised in that it comprises a base with a rising step (13) at the rear, vertical fins (14) being housed in the step.

9. Float according to any one of claims 1 to 8, characterised in that it comprises horizontal fins (15) on the horizontal portion (6).

10. Float according to any one of claims 1 to 9, characterised in that the upper portion (7) has substantially uniform horizontal cross-sections.

ABSTRACT

FLOAT FOR A TOWED LINE

This float comprises a fuselage (6) analogous to classic floats, but which here is topped by a leg (7) such that the fuselage (6) is completely submerged. This arrangement, combined with others that are secondary, makes it possible to reduce the vertical oscillations of the float produced by the sea swell while still ensuring good directional stability and satisfactory stability relative to other disturbances. Thus, a structure (1) suspended from the float (5) and which is part of a line (2, 3) towed by a ship remains at a constant depth. This invention can be applied, for example, to seismic tests at sea.

Figure 1.

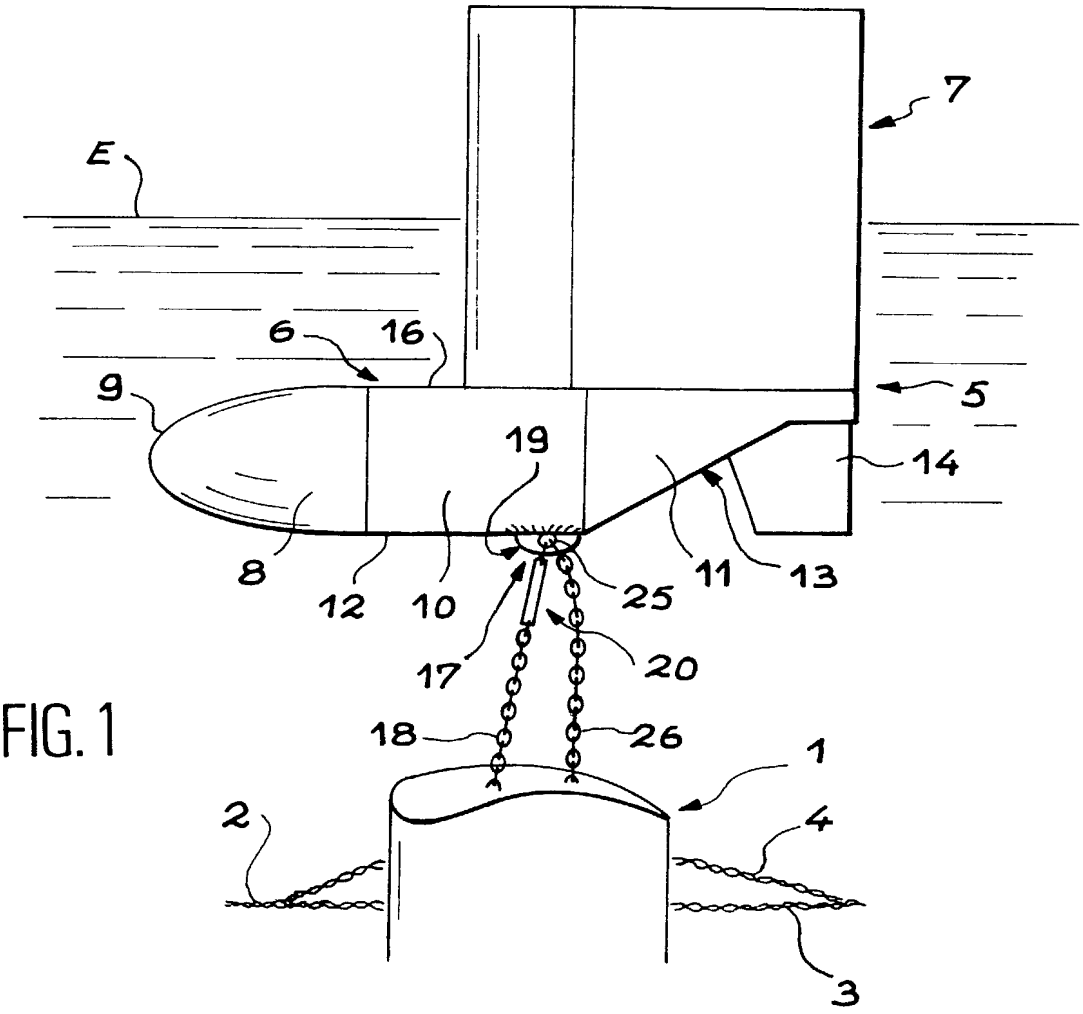


FIG. 1

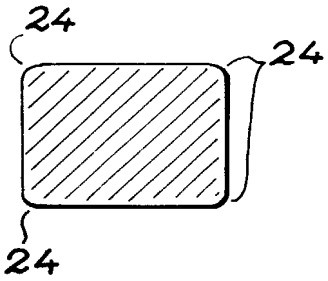


FIG. 3

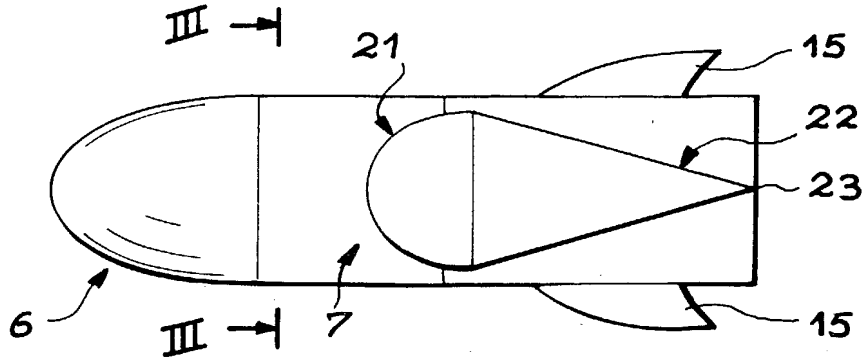


FIG. 2

#04

SP 16998 JCI

Declaration, Power Of Attorney and Petition

WE (I) the undersigned inventor(s), hereby declare(s) that :

My residence, post office address and citizenship are as stated below next to my name,

We (I) believe that we are (I am) the original, first, and joint (sole) inventor(s) of the subject matter which is claimed and for which a patent is sought on the invention entitled : FLOAT FOR A TOWED LINE

the specification of which

☐ is attached hereto.

☐ was filed on

as Application Serial No.

and amended on

☒ was filed as PCT international application

Number PCT/FR00/02030

on July 13, 2000

and was amended under PCT Article 19

on June 06, 2001

We (I) hereby state that we (I) have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

We (I) acknowledge the duty to disclose information known to be material to the patentability of this application as defined in Section 1.56 of Title 37 Code of Federal Regulations.

We (I) hereby claim foreign priority benefits under 35 U.S.C. § 119 (a)-(d) or § 365 (b) of any foreign application(s) for patent or inventor's certificate, or § 365 (a) of any PCT International application which designated at least one country other than the United States, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or PCT International application having a filing date before that of the application on which priority is claimed. Prior Foreign Application (s)

Application No.	Country	Day/month/Year	Priority Claimed
99 09249	FRANCE	16 JULY 1999	☒ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO
			☐ YES ☐ NO

We (I) hereby claim the benefit under Title 35, United States Code, § 119 (e) of any United States provisional application(s) listed below.

(Application Number)	(Filing Date)
(Application Number)	(Filing Date)

We (I) hereby claim the benefit under 35 U.S.C. §120 of any United States application(s), or § 365(c) of any PCT International application designating the United States, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. § 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56 which became available between the filing date of prior application and the national or PCT International filing date of this application.

Application Serial No.	Filing Date	Status (pending, patented, abandoned)

(17) And we (I) hereby appoint :Charles B. Gordon, Registration Number 16,923; William C. McCoy, Registration Number 16,885; Louis V. Granger, Registration Number 15,999, William A. Gail, Registration Number 17,409; Richard H. Dickinson Jr, Registration Number 18,622; Thomas P. Schiller, Registration Number 20,677; David B. Deioma, Registration Number 22,841; Joseph J. Corso, Registration Number 25,845; Howard G. Shimola, Registration Number 26,232; Jeffrey J. Sopko, Registration Number 27,676; John P. Murtaugh, Registration Number 34,226; James M. Moore, Registration Number 32,923; David E. Spaw, Registration Number 34,732; Michael W. Garvey, Registration Number 35,878; Paul R. Katterle, Registration Number 36,563; Richard M. Mescher, Registration Number 38,242 and Mark E. Bandy, Registration Number 35,788; our (my) attorneys, with full powers of substitution and revocation, to prosecute this application and to transact all business in the Patent Office connected therewith; and we (I) hereby request that all correspondence regarding this application be sent to the firm of PEARNE, GORDON, McCOY & GRANGER whose Post Office Address is : 526 Superior Avenue east Suite 1200 Cleveland, Ohio 44114-1484.

We (I) declare that all statements made herein of our (my) own knowledge are true and that all statements made on information and belief are believed to be true ; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such wilful false statements may jeopardise the validity of the application or any patent issuing thereon.

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Signature of Inventor

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Signature of Inventor

Date

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Post Office Address : The same as residence

NAME OF FOURTH INVENTOR

Signature of Inventor

Date

Residence :

Citizen of :

Post Office Address : The same as residence

NAME OF FIFTH INVENTOR

Signature of Inventor

Date

Residence :

Citizen of :

Post Office Address : The same as residence